Inv-2449

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

PENNSYLVANIA RAILROAD

TRAFFORD, PA.

SEPTEMBER 27, 1940

INVESTIGATION NO. 2449

SUMMARY

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Railroad:	Pennsylvania
Date:	September 27, 1940
Location:	Trafford, Pa.
Kind of accident:	Derailment
Train involved:	Express
Train number:	1
Engine number:	3858
Consist:	16 cars
Speed:	60-70 m. p. h.
Operation:	Automatic block and cab-signal system
Track:	Tangent; 0.83 percent descending grade westward
Weather:	Foggy
Time:	7:42 a. m.
Casualties:	2 killed
Cause:	Excessive speed entering cross-over, because of failure to obey signal indications

To the Commission:

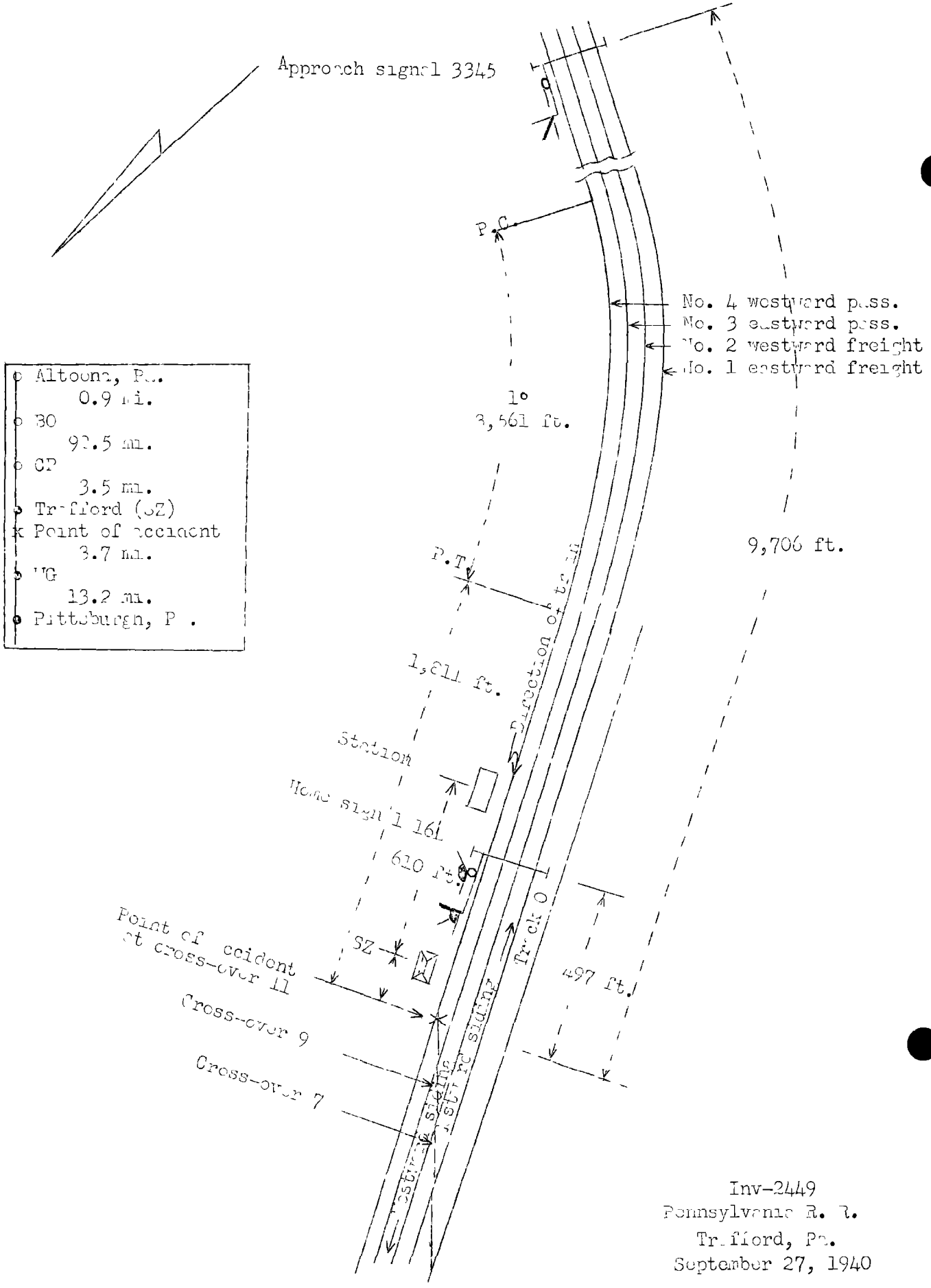
On September 27, 1940, there was a derailment of an express train on the Pennsylvania Railroad at Trafford, Pa., which resulted in the death of two employees.

Location and Method of Operation

This accident occurred on that part of the Pittsburgh Division which extends between BO block station, Altoona, Pa., and Pittsburgh, Pa., a distance of 112.9 miles. In the vicinity of the point of accident this is a 4-track line over which trains moving with the current of traffic are operated by an automatic block and cab-signal system; signal indications supersede time-table superiority. At Trafford there is an interlocking controlled from SZ tower, located 610 feet west of the passenger station. From CP block station westward to SZ, a distance of 3.5 miles, the main tracks from south to north are: No. 1, eastward freight; No. 2, westward freight; No. 3, eastward passenger; No. 4, westward passenger. West of SZ tower, however, tracks Nos. 1 and 2 are known as the eastward and the westward sidings, respectively. Cross-over 11, the east switch of which is located 35 feet west of SZ tower, connects track No. 4 and track No. 3; cross-over 9, the east switch of which is located 254 feet west of SZ tower, connects track No. 3 and track No. 2; these are facing-point for movements with the current of traffic. The accident occurred at the east frog of cross-over 11 at a point 116 feet west of the tower. As the point of accident is approached from the east on track No. 4 there are, in succession, a tangent 5,134 feet in length, a 1°00' curve to the right 3,561 feet in length, and a tangent 1,811 feet to the point of accident. The grade for west-bound trains is 0.83 percent descending at the point of accident.

Cross-over 11 is 197 feet in length and is provided with a No. 10 turnout having a curvature of 7°28'37"; there is no super-elevation. The point of the east frog is 81 feet west of the east switch. The main-track structure consists of 131-pound rail, 39 feet in length, laid on 22 treated hardwood ties to the rail length; it is double-spiked, fully tieplated, ballasted with crushed rock to a depth of 36 inches, and is well maintained.

The interlocking machine at SZ tower is of the electro-pneumatic type, consists of 23 working levers, and is provided with approach and route locking. Approach signal 3645 and home signal 16L governing westward movements on track No. 4 are



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located on signal bridges 9,706 feet and 497 feet, respectively, east of the point of accident. Signal 3345 is an automatic signal of the 2-unit, position-light type, approach lighted; its normal indication is approach. Signal 16L is a semi-automatic signal of the 2-unit, position-light type. When the route is lined for a cross-over movement from track No. 4 to track No. 2, signal 3345 displays an approach indication and home signal 16L displays a caution-slow-speed indication. The indications, names and corresponding rule numbers are as follows:

Signal No.	Indication	Name	Rule No.
3345	A train exceeding one-half its maximum authorized speed here must at once reduce to not exceeding that speed. Approach next signal prepared to stop.	Approach-Signal	283
16L	Proceed at not exceeding 15 miles per hour with caution prepared to stop short of train or obstruction.	Caution-slow-speed-Signal	278

Engines are equipped with position-light cab signals, which are located at the front of the cab and to the right and left sides of the firebox; a warning whistle and an acknowledging device are provided.

Special instructions read in part as follows:

> S25B
> 4d. If the cab-signal warning whistle sounds longer than six seconds, the Fireman on an engine, * * *, will immediately go to the Engineman

An approach indicator, located in SZ tower, gives information of the approach of a west-bound train on track No. 4 from a point 14,219 feet east of the home signal.

The maximum authorized speed for passenger trains in this territory is 70 miles per hour.

The weather was foggy at the time of the accident, which occurred at 7:42 a. m.

Description

No. 1, a first-class west-bound express train, with Conductor Wilson and Engineman Smith in charge, consisted of engine 3858, of the 4-6-2 type, one express car, two refrigerator cars, seven express cars, one refrigerator car, three express cars, one passenger-baggage car, and one express car, in the order named; all cars were of steel construction. This train left UN block station, near Gallitzin, 84.9 miles east of Trafford, at 6 a. m., according to the train sheet, passed CP block station at 7:38 a. m., passed signal 3345, which was displaying an approach indication, passed signal 16L, which was displaying a caution-slow-speed indication, and, while moving at a speed estimated to have been between 60 and 70 miles per hour, entered cross-over 11 and was derailed.

Engine 3858 and its tender stopped on their left sides on the eastward siding 544 feet beyond the point of derailment, and were badly damaged; the engine truck became disengaged, proceeded on track No. 3 and stopped, partially derailed, approximately 191 feet beyond the front end of the engine. The second course of the boiler was badly damaged; the wash-out flange caps were broken out of the firebox roof-sheet; the cab was demolished. The first five cars stopped in various positions within a distance of about 140 feet to the rear of the tender and fouled all four main tracks; these cars were badly damaged; the superstructure of the fourth car was demolished. The sixth to ninth cars, inclusive, were derailed and stopped to the left of cross-over 9 and in general line with it; the sixth and seventh cars leaned slightly to the left. The front truck of the tenth car was derailed; this car stopped near the west end of cross-over 10. Engine 6849, which was standing on a track nearby, was struck by the wreckage and was badly damaged.

The employees killed were the engineman and the fireman of No. 1.

Summary of Evidence

Conductor Wilson stated that at Altoona an air-brake test was made by car inspectors and the brakes were reported to be operative. The only stop made en route was at Gallitzin where the helper engine was cut off, then the brakes were applied and released and the rear two cars were inspected to ascertain if the brakes functioned properly. A running test was made soon after the train left that point. When a cross-over movement was made at RG, 11 miles east of Trafford, the brakes controlled the speed properly. When the train was approaching SZ tower the speed was 60 miles per hour and he felt an emergency application of the brakes, which was followed immediately by the derailment.

The train stopped at 7:41 a. m. Because of fog he was unable to see signals between CP and Trafford. He did not hear any engine whistle signal sounded as the train approached Trafford. After the accident he observed home signal 16L displaying a stop indication. His train rarely makes a cross-over movement at SZ tower and he had no knowledge that it was to be routed to track No. 2. He had no reason to think that the cab signals were inoperative. When cab signals become inoperative enginemen are required to report the fact to the superintendent and, if authorized by the superintendent, the train may proceed at one-half the authorized speed, or 35 miles per hour. He had been working with Engineman Smith during the past 5 months; he had talked and compared time with Engineman Smith before leaving Altoona.

Flagman Harter stated that before leaving Altoona he talked with Engineman Smith, who appeared to be normal. The last air-brake application which he felt was made to reduce speed to enter a curve east of Manor, 6.7 miles east of Trafford. As his train passed mile post 306, located about 2,500 feet east of the point where the accident occurred, he felt a light application of the air brakes but there was no material reduction in speed. His train was moving about 65 miles per hour when the air brakes became applied in emergency and the train stopped within a distance of about 400 feet. The accident occurred at 7:41 a. m. It was very foggy near Trafford and visibility was limited to a distance of 600 to 900 feet. Subsequent to the accident he found the air brakes applied on the rear eight cars.

Operator Pool, at SZ tower, stated that the last through movement on track No. 4 prior to the accident was LCL-1, which passed at 7:27 a. m. He restored home signal 16L to stop and it remained in that position until he changed it to display caution-slow-speed for No. 1 just prior to the accident. Before the arrival of No. 1 he lined the route on track No. 2 for YR-1, a west-bound train, which was standing east of the home signal on track No. 2. LCL-1 stopped west of SZ on track No. 4. He was instructed to route No. 1 from track No. 4 to track No. 2; he then lined the route for No. 1 to move through cross-overs 11 and 9 and set home signal 16L to display a caution-slow-speed indication. About 5 or 10 seconds after the route had been lined he saw No. 1, moving at a speed of between 60 and 70 miles per hour, about two engine lengths east of the home signal. He did not notice any sparks flying from the wheels, nor did he see the engineman. Signal 16L was displaying a stop indication and signal 3345 was displaying an approach indication prior to the changing of the route for No. 1. Several minutes after the accident occurred a trackman informed him that something had been wrong with the engineman of No. 1, as he had seen the engineman's head hanging out the cab window in an unnatural position.

Train Dispatcher Fleck, at Pittsburgh, stated that about the time No. 1 was nearing CP block station the operator at WG, 3.7 miles west of Trafford, informed him that LCL-1 had stopped on track No. 4 in that vicinity. The dispatcher instructed the operator at SZ to clear track No. 2 for No. 1. While the normal operation for No. 1 is on track No. 4, and track No. 2 is normally used for freight movements, it is not unusual to route trains through interlockings over any of the tracks available. On his district the weather was foggy with varying density. The accident occurred at 7:42 a. m.

Trackman Stemple stated that he was walking eastward along the north side of track No. 4 when he saw No. 1 as it passed Trafford station about 750 feet distant; the headlight was burning. His attention became attracted by the unnatural position of the engineman. The trackman stopped about 65 feet west of the frog where the derailment occurred and watched the engine as it approached. The engineman appeared to be in a slouched position, his right arm was hanging over the arm rest of the cab-window, and his head was lying on his shoulder and extending about 6 or 8 inches beyond the outer edge of the windshield. The engineman was not looking up and his position did not change at any time. As the engine entered the cross-over the engine truck became derailed at the frog. The trackman did not hear the whistle sounded nor did he see the fireman. There was no indication of fire from the brake shoes.

Signal Maintainer Gaskill stated that he was in SZ tower at the time the accident occurred. He observed that the route was lined for a cross-over movement from track No. 4 to track No. 2. Immediately after the accident he left the tower and observed that the home signal displayed a stop indication. About a month prior to the accident the switch machines at cross-over 11 were checked, and signal 16L was checked about a week prior to the accident. He had not experienced any difficulty with the cross-overs involved; no false indications had been displayed by the signals. He was unable to say how long signal 16L was at stop prior to the time it was changed for the movement of No. 1.

Track Foreman Shawley stated that he was about 300 feet west of the point where the accident occurred, but it was too foggy for him to see No. 1 approaching. Cross-over 11 was in good condition; he had last gaged it on September 22 or 24.

Track Supervisor Souvain stated that at the time the accident occurred he was in his office, which is located on the north side of the Trafford passenger station. Although it was foggy at that time he could see westward a distance of 1,000 feet. Subsequent to the accident he inspected the track and

found the switch points of cross-over 11 in good condition. The first mark of derailment that he saw was on the north rail of the cross-over about 16 feet west of the frog at track No. 3, and there appeared to be a burned mark as a result of heavy pressure on the frog. On the turnout guard-rail about 2 feet west of the frog point there was a mark 10 inches long and about 4 inches from the gage side of the rail; this mark ran diagonally toward the inside. He said that it could have been made by the engine wheels jumping out of the flangeway and striking the middle of the top of the guard rail. He checked the gage through the turnout eastward to the home signal; it was uniform and did not exceed 4 feet 8-3/4 inches at any point.

The statements of the crew of VL-2, which was on track 0 south of the point where the accident occurred, indicated that because of the fog visibility was limited to a distance of 10 or 20 car lengths. Their engine, 6849, was struck by the wreckage. Subsequent to the accident the engineman of VL-2 went to the engine cab of No. 1 and found both brake valves in running position, the throttle closed and the reverse lever in position for forward motion. The cab-signal lights were not lighted. He did not examine the cab-signal whistle.

The engineman of YR-1, a west-bound freight on track No. 2, which was being held on account of No. 1, stated that when his train first arrived at the home signal the fog was so dense that he could not see the signal a greater distance than 3 car lengths. His train stood there about 7 or 8 minutes before it received a caution-slow-speed indication, and it had just started to leave when the signal was changed to stop. He looked over to track No. 4 and observed that the signal governing that track displayed a caution-slow-speed indication. No. 1 then passed at a speed of about 70 miles per hour.

Engineman Engel, of No. 51, which followed No. 1 to Trafford, stated that he received an approach indication at signal 3345 and a stop indication at home signal 16L. Near the station platform he was flagged by the flagman of No. 1. Because of fog visibility was restricted to 300 or 400 feet.

Fireman Mudge, of No. 51, stated that since June he had been operating with Engineman Smith on No. 38 from Pittsburgh to Altoona and had never heard him complain of ill health or indicate that he had any worry. On their last trip together, which was on the night prior to the day of the accident, Engineman Smith appeared to be in normal health.

Engineman Miller stated that he operated engine 3858 from Harrisburg to Altoona on the morning of the accident. The cab-signal system operated properly when tested after arrival at Altoona. At Altoona he talked with Engineman Smith, who seemed to be in normal condition.

Statements of acting gang foreman and car inspectors at Altoona indicate that terminal inspection of No. 1 and air-brake test were made before No. 1 departed from that point; the equipment was in good condition and all brakes functioned properly.

Assistant Road Foreman of Engines McGaughey stated that he arrived at the scene of accident at 8:02 a. m. and found that the cab-signal whistle was not cut out.

Supervisor of Telegraph and Signals Darrah arrived at SZ at 8:55 a. m. and found signal 16L in stop position and the switch and signal levers at the tower in normal position except Nos. 11 and 9, which were in reverse position. The switch and signal levers were equipped with blocking devices. Inspection of the track disclosed that cross-over 11 was in reverse position and locked; the west end of this cross-over and cross-overs 9 and 7 were damaged as a result of the derailment. Approach signal 3345 displayed a stop-then-proceed indication as some of the cars of No. 1 were on the track circuit. The local controls of wayside signals and the code for cab signals were disconnected at the home and the approach signals until after track No. 4 had been cleared; the control wires were then restored, a check was then made at each signal and at the tower, and the signal apparatus was found to be operating as intended. A detailed check was made of the switch and signal equipment; these tests included a check of mechanical locking and spring combination for proper position of springs, bands, and wiring; segments and indication magnets were checked; all relays were tested for pick-up and drop-away, and for mechanical defects; all wiring was tested with a megger; an inspection of all signal equipment at tower and signal locations was made and all cables were inspected for mechanical defects. The tests showed that all apparatus was functioning properly and in accordance with the carrier's requirements.

Master Mechanic Marks stated that he examined engine 3858 subsequent to the accident and found all wedges free, spring rigging intact and in good condition, and the chafing castings between the engine and the tender in good condition and well lubricated. The engine truck and the trailer truck were badly damaged as a result of the derailment; the connecting castings of the engine truck were in suitable condition for service. He furnished the following measurements of the engine-truck wheels, the driving wheels, and the trailer wheels:

Wheels	Lateral	Wear	Flange Wear
No. 1 engine truck	3/8"	0"	0"
No. 2 engine truck	1/2"	0"	0"
No. 1 driving	5/16"	3/32"	0"
No. 2 driving	7/16"	3/32"	0"
No. 3 driving	7/16"	3/32"	0"
Trailer truck	11/16"	3/32"	0"

	Wheel-spacing	
	Back-to-back	Throat-to-throat
No. 1 engine truck	53-1/8"	-
No. 2 engine truck	53-3/16"	-
No. 1 driving	53"	55-1/2"
No. 2 driving	53-1/16"	55-15/16"
No. 3 driving	53"	56-3/32"

The thickness of tires and diameters of companion wheels were within the prescribed limits. The tender trucks were in suitable condition for service. There was no defective condition of the tender which might have contributed to the derailment.

Division Engineer Greenough stated that according to A. R. E. A. formulas, a No. 10 turnout having no superelevation is safe for speeds up to 33 miles per hour, and the theoretical overturning speed is 61 miles per hour. He stated that the switch points at the east end of cross-over 11 fitted perfectly and it was evident that engine 3858 negotiated the turnout to the frog, at which point the engine was apparently turning over to the right to such an extent that the left wheel-flanges were raised above the frog guard-rail and caused a wheel to strike and to go over the frog point.

After the accident, to prevent additional damage to the cab-signal equipment on engine 3858, the equipment box and headlight generator were removed from the engine before it was rerailed. On October 2, the equipment was removed from the equipment box and an operating test and a shop test were made at Pitcairn Relay Shop. Two amplifying tubes were applied in lieu of the broken tubes and the equipment in its original condition was given an operating test; it responded properly to each change in code condition. Further tests and checks were made, from which it appeared that the equipment was in proper operating condition at the time of the accident.

According to data furnished by the carrier, the total weight of engine 3858 in working order was 308,890 pounds, distributed as follows: Engine truck, 53,640 pounds; driving wheels, 201,830 pounds; trailing wheels, 53,420 pounds. The tender had two four-wheel trucks; its capacity was 12,150 gallons of water and 18 tons of coal. The weight of the tender loaded was 212,725 pounds. The rigid wheel-base of the engine was 13 feet 10 inches; the total wheel base was 36 feet 2 inches; the total length of the engine and tender was 82 feet 11-3/4 inches.

Engineman Smith was 61 years of age and had last been given a physical examination on August 28, 1940; the record does not indicate any bad health condition.

Observations of the Commission's Inspectors

Inspection of the track indicated that there was no mark of dragging equipment. The first indication of derailment was a batter mark about the size of a dime on the east end of the point of the east frog of cross-over 11; from this point a flange mark extended across the block and ended on the outside of the north cross-over rail at a point 6 feet 5 inches west of this batter mark. At points 9 feet 4 inches and 14 feet 3 inches, respectively, west of the batter mark there were rubbed marks on the face and outside edge of the head of the south rail of track No. 4. On the outside of the north cross-over rail there was a bruise on the upper east corner of an angle bar at the rail joint, which is 16 feet 8 inches west of the tip of the frog, and the east bolt was sheared off and the remaining three bolts were bent and scarred. On the second tie west of this joint there was a flange mark 9 inches north of the rail, which continued parallel to the rail on the following nine ties. On the inside of the south cross-over rail there was a diagonal flange mark on top of the guard rail, beginning at a point 25 inches west of the point of the frog and 4 inches north of the gage side of the running rail; it extended westward a distance of 9 inches and ended on the inside edge of the guard rail. At a point 10 feet 9 inches west of this point, flange marks appeared on the ties 13 inches from the gage side of the south rail and continued to the point where the track was torn up. The west end of the cross-over was torn out by the derailed equipment. Cross-over 9 and portions of tracks Nos. 3, 2 and 1 were torn up and badly damaged.

Examination of the equipment disclosed no condition that might have contributed to the accident. The engine-wheel flanges were somewhat worn but in serviceable condition; those on the engine truck were newly scarred and rubbed in many places; the contours of the flanges were in good condition.

Observations were made of the installation and operation of the interlocking plant and it was found to be substantially as previously described. Observation was made of the distant signal when actuated both by test and by train, and it was found to be operating as intended. A check in connection with signal 16L revealed that an interval of 3 minutes 58 seconds was consumed for the time-release to run down.

Discussion

According to the evidence, track No. 4 was occupied west of SZ tower and it was arranged to divert train No. 1 to track No. 2. The route was lined for No. 1 to make a cross-over movement from track No. 4 to track No. 2 and the proper signal indications were displayed. No. 1 approached Trafford at a speed estimated from 60 to 70 miles per hour, entered the cross-over without reduction in speed, and was derailed at the east frog. According to A. R. E. A. tables, the maximum safe speed through this turnout is 33 miles per hour and the overturning speed is 61 miles per hour. A batter mark on the east end of the east frog, and flange marks on the head of the south guard rail, on the block of the frog, and between the south rail of track No. 4 and the north rail of the cross-over, indicated conclusively that wheels on the right side of the engine were bearing heavily against the right wing of the frog while the left wheels were on top of the head of the south guard rail; these conditions permitted the engine-truck wheels on the right side to bear sufficiently to the right in the throat of the frog so that the right wheels were diverted to the top of the block and thence between the south rail of track No. 4 and the north rail of the cross-over.

The brakes had been tested at Altoona and Gallitzin, points 97 miles and 85 miles, respectively, east of the point of accident. The brakes were used frequently between Gallitzin and the point of accident and they functioned properly. The last time the brakes were used was at a point 6.7 miles east of the point of accident. Subsequent to the accident both brake valves were found in running position. No defective condition of the equipment nor of the track that would have contributed to the cause of the accident was found.

Tests of the cab-signal system, on the engine involved, made subsequent to the accident indicated that it was functioning properly. The warning whistle was found to be cut in for service. Tests of the interlocking made subsequent to the accident disclosed that the proper signal indications were displayed; and in addition, one witness saw the home signal on track No. 4 displaying caution-slow-speed as No. 1 approached.

The distant signal, located 9,209 feet east of the home signal, displayed an approach indication, which required the train to approach the home signal prepared to stop. The home signal, located 416 feet east of the cross-over involved, displayed caution-slow-speed, which required the speed to be reduced to not exceeding 15 miles per hour; however, No. 1 passed the home signal at a speed considerably in excess of 15 miles per hour. Why the engineman did not control the speed of his train in accordance with signal indications probably is accounted for by the testimony of a trackman who observed the position of the engineman as No. 1 approached. The trackman said that the engineman was in an unnatural position, that his right arm was hanging over the arm-rest of the cab window and his head was lying on his shoulder and extending about 6 or 8 inches beyond the outer edge of the windshield, and that the engineman's position did not change. From this it appears that the engineman was incapacitated when No. 1 was approaching the home signal involved. Just when he became incapacitated is not known but at a point 6.7 miles east of the point of accident he used the brakes in reducing speed to enter a curve. As both the engineman and the fireman were killed in the accident, the exact condition of the engineman and the time when he became incapacitated are not known; however, it is probable that the engineman became incapacitated at some point between the distant signal and the home signal because failure to acknowledge the cab-signal whistle at the distant signal should have prompted the fireman to take action. One month before this accident occurred the engineman was given a physical examination; the record of that examination did not indicate any bad health condition.

Conclusion

This accident was caused by the train entering a cross-over at an excessive rate of speed, because of failure to obey signal indications.

Respectfully submitted,

S. N. MILLS,

Director.